

Studies on Zingiberaceae of N.E. India : II. Notes on *Etlingera* Giseke*

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Abstract

The genus *Etlingera* Giseke (1792) and its type species *E. littorale* (Koenig) Giseke was described from Thailand based on *Amomum littorale* Koenig (1783). It remained unrecognised till few years back when Burtt and Smith (1986) re-circumscribed and re-established by uniting three genera viz. *Achasma* Griffith (1851), *Nicolaia* Horaninow (1862) and *Geanthus* Veleton (1914) under it. In India, it is represented by two species viz., *E. linguiformis* (Roxb.) Smith and *E. loroglossa* (Gagnep.) Smith; both occur in N.E. region. Earlier, these species were treated under *Amomum* (Baker, 1890), *Hornstedtia* (K. Schum., 1904; Rao & Verma, 1972) and *Achasma* (Larsen, 1981) and thus reflected the controversy in generic assignment. Critical studies based on fresh collection from Meghalaya and Arunachal Pradesh, resulted in better understanding of taxonomic characters. The paper highlights the generic delimitation, and provides detailed description of the two Indian species.

INTRODUCTION

The North-Eastern India has greatest diversity of zingiberaceous flora (next to Malaysia) especially in number of genera. The family is represented here by 19 genera and about 90 species, out of 22 genera and about 170 species reported from India. In Malaysia, the family is represented by 24 genera and about 700 species (i.e. 50% of the total in the world), but it is remarkable that the numbers of genera are less (in Malaysia) in comparison to species. The authors initiated the critical taxonomic studies on Zingiberaceae of N.E. India since last three years and came across with several interesting findings. The present paper is the second one in series which deals with *Etlingera* Giseke, the genus not described taxonomically so far in India except in enumeration (Karthikeyan *et al.*, 1989; Jain & Ved Prakash, 1995).

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Historical Aspect

The genus *Etlingera* was established by Giseke in 1792 with its only species *E. littorale* (Koenig) Giseke. It was wholly based on the description of *Amomum littorale* Koenig (Retz. Obs. Bot. 3: 52. 1783) as its type specimens collected from Thailand (Phuket Is., Yunk Seylan or Junk Ceylon, Koenig, s. n.) were not available to Giseke because they were lost at sea.

Subsequently, three other genera (allied to *Amomum*) were described, these are: *Geanthus* Reinv. (Syll. Pl. Soc. Ratisb. 2: 5. 1825), *Acasma* Griff. (Not. Pl. Asiat. 3: 411-426. 1851) and *Nicolaia* Horan. (Prod. Monogr. Scit. 32, 1862). Bentham (1883) and Baker (1890) reduced *Etlingera* and above three genera as a section of *Amomum*. Valeton (1914) reconstituted the genus *Geanthus* and excluded all the original species of Reinwardt with the introduction of a new character: the basal part of the labellum and filament are fused to form an internal tube. With the highlighting of above as a main character, Burt and Smith (1986) reduced the three genera (viz. *Geanthus*, *Achasma* & *Nicolaia*) under *Etlingera*, an earliest name for the composite genus. Later, Smith (1986) transferred 57 species to *Etlingera* from *Geanthus* (15 species), *Amomum** (12 spp.), *Achasma* (5 spp.), *Nicolaia* (6 spp.), *Alpinia** (3 spp.) and *Donacodes* (1 sp.). Presently, *Etlingera* is known by about 70 species distributing from Himalayas and S.W. China through Myanmar, Thailand, Malaysia, Indonesia, N. Guinea and N. Queensland.

Representation in India

In India, the genus *Etlingera* is represented by two species viz., *E. linguiformis* (Roxb.) Smith and *E. loroglossa* (Gagnep.) Smith; occurring both in N.E. region. Prior to *Etlingera*, these species were treated under different genera such as *Amomum* (Baker, 1890), *Hornstedtia* (K. Schumann, 1904; Rao & Verma, 1969, 1972) and *Achasma* (Larsen, 1981). Previous treatment reflected the controversy in generic assignment and also indicated to be inadequate characters for separating them at generic level. The authors had an opportunity to understand the taxonomic delimitation of genus *Etlingera* (as recircumscribed by Burt & Smith, 1986) though the study of above two species based on own fresh and pickled collections made recently from Meghalaya and Arunachal Pradesh. The study revealed that the genus *Etlingera* is closely allied to *Amomum* in having subterranean inflorescence and singly born flowers in the axils of primary bracts with tubular bracteoles; but differs from it in having a distinct tube formed above the insertion of the petals by the union of the lower part of the labellum and filament of stamen. In *Amomum* inflorescence tends to elongate after flowering and lacks an involucre of sterile bracts while in *Etlingera* inflorescence is with sterile involucre bracts and does not elongate after flowering.

However, the present circumscription of *Etlingera*, as defined by Burt and Smith (1986) is of a very heterogenous nature. The only common constant character for delimiting the complex group is the presence of a tube formed by the union of the basal part of the

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labellum and filament of stamen which is visible only after the dissection of flower. But, there is great diversity in other characters. For instance, the inflorescence is long peduncled (up to 1 m tall) and held always well above the ground in several species (not in India) which were treated so far under *Nicolaia* Horan. Similarly, the labellum, in some species (referred so far to *Achasma*) is very long, tri-partite with broad folded base and elongated in central part with entire or bifid apex (as in Indian representatives), while in other species lip is short without distinct lobes and not expanded in central part.

Since the genus *Etlingera* has not been described in India so far, an artificial key, upto date nomenclatural citations and brief description are provided to distinguish the genus from other allied genera. *E. loroglossa* an endemic Indian species, is also described and illustrated herewith new distributional record.

Key to *Etlingera* and allied genera (Tribe Alpineae)

1. Inflorescence fusiform or occasionally cyathiform, enclosed by an involucre of rigid sterile bracts; flowers opening 2-3 at a time; corolla tube much longer than the labellum **Hornstedtia**
1. Inflorescence usually cone shaped or flat-topped, with or without an involucre of sterile bracts, if present not markedly rigid; often with many flowers open at a time; corolla tube not longer than the labellum:
 2. Sterile involucre bracts absent; infructescence elongating with age; lip and filament not joined in a tube above the petals; mostly anthers with well developed crest **Amomum**
 2. Sterile involucre bracts present (rarely reduced to 3-4 bracts); infructescence not elongating with age; lip and filament always joined to form a distinct tube; mostly anthers without crest **Etlingera**

Etlingera Giseke, Prael. Ord. Nat. 209. 229, 251. 1972; Burt & Smith, Notes Roy. Bot. Gard. Edinb. 43: 239. 1986.

Geanthus auct., non Rafinesque (1814), nec Philippi (1884): Reinwardt, Syll. Pl. Nov. Ratisbon. 2: 5. 1825; Valetton, Bot. Jahrb. 52: 43. 1914.

Achasma Griff., Not. Pl. Asiat. 3: 411, 426. 1851.

Nicolaia Horan., Monogr. Scit. 32. 1862.

Phaeomeria [Lindl., Nat. Syst. Bot. ed. 2, 446. 1836, *nom. inval.*] ex K. Schum., Pflanzenr. 261. 1904.

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Type: Etlingera littoralis (Koenig) Giseke (*Amomum littorale* Koenig in Retz., Obs. Bot. 3: 52. 1783).

Herbs ca. 1-3 m tall. Rhizomes articulate, aromatic with fibrous roots. Stem numerous, simple, robust, terete. Leaves distichous, petiolate, sheath open, glabrous; lamina oblong-lanceolate. Inflorescence radical; peduncle short, subterranean or long, erect, well above the ground, clothed with small, imbricately appressed scales. Bract outer (sterile ones) ovate, acute, keeled on back; inner ones oblong, slightly longer than the flower tube, apiculate, concave, 1-flowered; bracteole about equal to the flower tube, membranous, white, tubular, bifid at tip. Calyx tubular, apically 3-lobed, often longer than the corolla tube. Corolla tubular at base, tube slightly curved, petals 3, oblong, slightly unequal. Lateral staminodes absent or minute. Labellum broad at base with folded undulate-crispate margins, basally connate with filament, forming a tube above the petals. Stamen, opposite the labellum; filament short, stiff, flat; anther shortly crested or not. Ovary inferior, trilocular with axile placentation; epigynous glands-2; style ascending through tube to anther groove and slightly longer than it; stigma capitate. Fruit not seen.

Distribution: About 70 species mainly in Asiatic and Pacific regions viz., S.W. China, Burma, Thailand, India, Malaysia, Indonesia, New Guinea and N. Queensland. Two species in India viz., *E. loroglossa* and *E. linguiformis*.

1. *Etlingera loroglossa* (Gagnep.) Smith, Notes Roy. Bot. Gard. Edinb. 43: 247. 1986.

Amomum loroglossum Gagnep., Bull. Soc. Bot. France 1, 4: 258. 1902.

Homstedtia loroglossa (Gagnep.) Schum. in Engl., Pflanzenr. 46: 196, 1904; Rao & Verma, Bull. Bot. Surv. India 11: 247. 1969.

Achasma loroglossum (Gagnep.) Larsen, Nord. J. Bot. 1: 46. 1981.

Type: Herb. Ind. Or., Khasia Hills, 2000 ft., *Hook. f. & Thomson s. n.* (K).

Large, terrestrial herb upto 2 m tall with creeping rhizomes and fibrous roots. Stem leafy, erect upto 5 cm thick. Leaves large, petiolate; petiole \pm 1 cm long, hairy; lamina 48-58 x 5-9 cm, oblong-lanceolate, acuminate, glabrous; ligule \pm 1 cm, entire. Inflorescence radical, subterranean, \pm 12.5 cm long; peduncle \pm 8 cm long, partially underground, white, thick like a little finger, covered with small white scales. Bracts double; outer (sterile, involucre) sessile, imbricately appressed, rigid, white-pink, 1-4 cm long, ovate, acute, entire; inner (fertile) solitary, adnate to each flower, covering 1/2 diam. Corolla-tube, white, semi-transparent, striate, as long as corolla-tube, 5.0-6.5 x 0.5-0.8 cm, oblanceolate, acute; bracteole slightly shorter but broader than the corolla-tube, 5.0-5.5 x 1.0-1.5 cm, oblong, close at base, bifid at tip. Flower one per fertile bract, 7-9 flowers per cluster, 305 open at one time, 11-15 cm long with large yellow-brown labellum. Calyx quite longer than the corolla tube, 8.0-10.0 x 1.2-1.5

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cm, lorate-lanceolate, tubular at lower half, apically tri-dentate, pink. Corolla gamopetalous, tubular at base; tube 3.5-5.4 cm long, slightly curved, glabrous, white apically 3-lobed; lobes (petals) 2.3-3.5 x 0.5-1.2 cm, oblong, unequal, membranous, pink. Labellum (petaloid staminode, 6.0-6.5 cm long, orange-yellow with deep brown blotch at middle, tripartite with incurved and frilled margins, cordate at base, ± 2.1 cm wide, elongated at centre, 1.0 cm wide, emarginate at tip, 1.5 cm wide; connate basally with lower part of the filament, forming a distinct tube above corolla-lobes. Lateral staminodes obsolete. Stamen opposite the labellum, filament ± 0.5 cm, flat, fleshy, stiff; anther ± 0.7 -8 cm, thecae, parallel, slightly angled, truncate at tip, white towards margin, divided by a deep longitudinal groove; connective prolonged into a small ± 1 mm crest. Ovary $\pm 1.5 \times 1.0$ cm, pubescent, trilocular with numerous ovule on axile placenta; style 5-8 cm long, filiform; stigma capitate with small dorsal calus; epignous glands 2, 12 x 3 mm, yellowish, free from each other.

Flowering - Fruiting: Aug. - Oct.

Distribution: India: Endemic to N.E. Region.

Note: This species was so far known from Khasi Hills of Meghalaya and was representing by a few specimens in Herbarium of BSI at Shillong (ASSAM). The authors have collected this species for the first time from Arunachal Pradesh which forms a new distributional record.

Specimens examined: India, Arunachal Pradesh, Itanagar, Ganga Lake, 500 m, Oct. 10, 1996, Sunil Tripathi & Ved Prakash 20372 (CDRI); Meghalaya, Nongpoh, July 15, 1916 Verma 35606 (ASSAM).

2. *Etlingera linguiformis* (Roxb.) Smith, Notes Roy. Bot. Gard. Edinb. 43: 246. 1986.

Alpinia linguiforme Roxb., Pl. Cor. 3: 74, t. 276. 1819.

Amomum linguiforme (Roxb.) Benth., Gen. Pl. 3: 644: 1880; Baker in Hook. f., Fl. Brit. India 6: 235, 1890.

Hornstedtia linguiforme (Roxb.) Schum. in Engl., Pflanzcnr. 46: 196. 1904.

Achasma linguiforma (Roxb.) Loesen., Notizbl. Bot. Gart. Berl. 10: 62. 1927.

Lectotype: Roxb., Pl. Coromandel 3: t. 276.

The description is not provided here because this species is very similar to first one. The only major difference is in structure of labellum which is deeply bilobed at tip in this species, while in former the tip is emarginate.

Distribution: India: Sikkim, Assam, Meghalaya; Bangladesh.